SPECIFICATION:

Please amend the two consecutive specification paragraphs that begin on page 4, line 28, as shown below.

A layer of a ceramic thermal barrier coating material 34 is applied over the substrate on the outside surface of the tube 32, and a catalytic material 36 is exposed at the surface of the thermal barrier coating 34. A substrate for a catalyst should exhibit a large surface area for maximizing the contact between the catalyst and the fuel-air mixture passing over the substrate surface. Typical ceramic wash-coats used as catalyst substrates possess a specific surface area (SSA) of approximately 18-30 m^2/g. In order to maximize its exposed surface area, thermal barrier coating material 34 may be deposited onto the metal tube 32 by electron beam physical vapor deposition (EB-PVD) in order to produce a columnar-grained microstructure having a plurality of closely spaced columns of material, as illustrated in Figure 2. The deposition process parameters may be controlled to optimize the resulting surface area. The columnar grained structure is known in the art to provide a significant amount of open porosity on the exposed surface of the thermal barrier coating. An idealized ~~EB-TBC~~ EB-PVD columnar-grained thermal barrier coating structure may have an SSA of between 50-150 m^2/g, assuming that the structure has columns of approximately 10 microns diameter and 10 microns height covered with much smaller cones of material of approximately 1 micron diameter and 1 micron height. Although the actual SSA of ~~an TBC coating~~ a thermal barrier coating (TBC) deposited by EB-PVD has not been empirically measured by the present inventors, it is assumed that the actual usable specific surface area of an ~~EB-TBC~~ EB-PVD coating would be at least approximately the same magnitude as that of a ceramic wash coat substrate because the idealized surface area is so large. The deposition process can be controlled so that the SSA of the surface is at least 18 m^2/g, or in the range of 18-30 m^2/g.

The thermal barrier coating 34 may be any of the conventional ceramic compositions used for insulating a metal substrate from a high temperature environment, for example the widely used yttrium-stabilized zirconia (YSZ). The thermal barrier coating 34 may be deposited onto the tube 32 to any desired thickness,

in one embodiment to a thickness of about 0.020-inches. A bond coat 38 may be used between the substrate 32 and the thermal barrier coating 34. Common bond coat materials 38 include MCrAlY, where M denotes nickel, cobalt, iron or mixtures thereof, as well as platinum aluminide and platinum enriched MCrAlY. Techniques for applying ceramic thermal barrier coatings over high temperature metal alloys for use in the environment of a gas turbine combustor are well known in the art, so the catalytic element 30 of Figure 2 is expected to exhibit long life in this application without early mechanical failure. While EB-PVD coating processes are generally considered to be expensive, it is possible to coat a large number of tubes or other substrate forms simultaneously, thereby reducing the per-unit cost of the process. Furthermore, less expensive plasma or thermal spray coating processes, chemical vapor deposition processes, ~~EB-DVD~~ electron beam directed vapor deposition (EB-DVD) or ~~ESAVD~~ electrostatic assisted vapor deposition (ESAVD) processes may be developed for producing a similar columnar-grained structure or alternative high-SSA surface.

Please amend the paragraph that begins on page 6, line 24 of the specification as follows:

It is known to apply a sintering resistant material within the sub-micron sized gaps between adjacent columns of a columnar-grained structure, as described in United States patent 6,203,927 B1 issued on March 20, 2001. A high temperature catalyst material may similarly be applied within such gaps. The catalyst may be deposited using any known process, such as a sol gel, plasma spray or ~~CVD~~ chemical vapor deposition process. If additional surface area is desired for depositing the catalyst material 36, a ceramic wash coat 40 may be applied to the thermal barrier coating layer 34 before applying the catalytic material 36.